

**REMARKS**

Favorable reconsideration of the application as currently clarified and in view of the following remarks, is respectfully requested.

Claims 1-29 and 33-35 are currently pending in the application. Claims 30-32 were cancelled in a Preliminary Amendment. Amendments to the claims have been made in order to correct the indefiniteness set forth in the Official Action, as well as to better conform the claims to U.S. standards of form and practice. New claims 33-37 have been added as part of conforming the claims to US practice. In addition, claims 16 and 28 have been amended to further distinguish Applicant's claims from the prior art. Basis for the amendment to claims 16 and 28 can be found at least in Figs. 6a and 6b, and the accompanying portions of the specification. No new matter has been added.

By way of summary, the Official Action presents the following issues. Claims 2 and 18 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Claims 8, 12, 24 and 25 have been objected to based on the basis of an informality. Claims 1-7, 10-21 and 27-29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller et al (US 2003/0146377, hereinafter "Miller") in view of Syms (US 7,208,729). Claims 8, 9 and 24-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller in view of Syms and Guevremont et al (US 2006/0151694, hereinafter "Guevremont"). Claims 22, 23 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Miller in view of Syms and further in view of Apffel (US 6,649,908).

Turning first to the rejection of Claims 2 and 28 under 35 U.S.C. § 112 (second paragraph) and the objection to Claims 8, 12, 24 and 25, Applicant has revised these claims, in

light of the Examiner's comments. Accordingly, Applicant requests that this rejection and objection be withdrawn.

Turning next to the rejection of claims 1-7, 10-21 and 27-29 under 35 U.S.C. § 103(a) as being unpatentable over Miller in view of Syms, the Official Action takes the position (pages 3 and 4) that Miller fails to explicitly teach that the sample is placed into a corona discharge zone where the sample is to be ionized, and is ionized using a corona discharge to generate gas phase ions. To overcome this deficiency of Miller, the Official Action turns to Syms for teaching of a sample being placed into a corona discharge zone where the sample is to be ionized and is ionized using a corona discharge to generate gas phase ions. In particular, the Official Action relies on col. 4, lines 50-55 of Syms.

Applicant respectfully traverses the rejection for the following reasons. By way of background, Miller describes a miniaturized ion mobility spectrometer (FAIMS) which is coupled to electrospray ionization (ESI). Atmospheric pressure chemical ionization (APCI) is shortly mentioned but it has not been disclosed in the document that or how APCI would be miniaturized micromechanically. Electrospray ionization has no relevance with regard to the present application. In addition, as acknowledged by the Examiner, there is no spraying into a corona discharge zone within Miller. Turning to Syms, the reference describes a microfabricated mass analyzer and microfabricated ion sources which are based on electrons emitted from hot filaments or cold cathode, both being typical examples of electrospray ionization (ESI). The ion source is thus different from that of the present application and vaporization of the sample is not described at all. Col. 4, lines 50-55 does recite "in a further embodiment, a pair of electrodes is placed in front of the ion entrance optics and used with DC voltages in order to create a glow or corona discharge from which ions may be extracted."

However, upon review of Syms, Applicant finds that nowhere else in the reference does Syms refer to either a glow or a corona. Accordingly, Applicant believes that Syms at most would have suggested that it is known to have a corona discharge. However, the mere fact that a corona discharge is known, is not, in and of itself, a basis for modifying Miller. Miller, as shown in Fig. 3, is directed to electrospraying a sample 12. Sample 12 enters liquid chamber 14 which is controlled by controller 10D. High voltage 18 is provided from the controller to the electrospray sample which outputs from tip 20 of chamber 14. The received liquid sample is then in contact with carrier gas 90 which is inputted to create an ionized compound. The ionized compound is then filtered based on characteristics of ion species. Outputted from filter area, the ions go to detector 69 or to exhaust port 42 to be exhausted by exhausted gas 91; see paragraphs 112 and 118 of Miller. Because Miller is directed to electrospraying, and does not describe both vaporizing and a corona discharge, and Syms simply discloses that a corona discharge is known, there would be no reason why an artisan would have combined the teachings of Miller with Syms; particularly since use of a corona discharge is an alternative to electrospraying; see Guevremont, [para. 0142]. In any event, even if, assuming *arguendo*, the electrospray system of Miller was replaced with a corona discharge, Applicant's claims would still not be met because the vaporizer structure and steps of using the vaporizer structure would not be found in any combined teaching or suggestion of the references. From all of the above, Claim 1 is patentable over the combined teachings of Miller and Syms.

Turning next to claim 4, the Official Action takes the position (page 4) that the combined teachings of Miller and Syms fail to teach that the vaporizer and corona discharger are integrated into a single micromechanical structure. To overcome this deficiency of Miller and Syms, the Official Action asserts (page 4) that this limitation would have been obvious on the basis that

both Miller and Syms disclose monolithic micromechanical structures that work in the environment of mass spectrometer. However, this holding of the Examiner is incorrect. The fact that reference are in the same field of endeavor merely puts them within the art that might be considered by an artisan. The fact that references are in the same field is not a substitute for evidence and is not a suggestion of combining the teachings of the references. In addition, because Miller does not teach both a vaporizing zone and a corona discharge zone and Syms merely suggests that corona discharge zones are known, an artisan would not consider these teachings a suggestion of arriving at the language of Claim 4. In addition, as noted above with respect to Claim 1, a corona discharge is an alternative to the electrospray of Miller. To provide both a vaporizer zone and a corona discharge zone and to further integrate both into a single micromechanical structure, is not suggested by the prior art. Accordingly, claim 4 is also patentable over the combined teachings of Miller and Syms.

Turning next to claim 6, the claim recites, in part, a substrate wafer in which flow channel networks for gas and liquid are formed, and a cover wafer, in which a heater for vaporizing the sample is patterned, is attached to the substrate wafer. The Official Action takes the position (page 5) that heaters are discussed in paragraphs 153-156 of Miller. From Applicant's review of the applied references, Applicant does not find a teaching of a cover wafer having a heater patterned therein. The fact that Miller may disclose heaters is not a teaching for having a cover wafer including a heater pattern therein. Nor does the fact that Miller discloses wafer sectioning in Fig. 4B suggest the specific language of Claim 6. In the absence of any teaching or suggestion in the prior art as to the limitations of Claim 6, the claim is patentable over the combined teachings of Miller and Syms.

Turning to Claim 7, the Official Action takes the position (pages 5 and 6) that Miller fails to explicitly teach that the sample is placed into a corona discharge zone where the sample could be ionized using a corona discharge to generate gas phase ions. It is asserted that Syms teaches placing a sample into a discharge where the sample can be ionized using a corona discharge to generate gas phase ions. Firstly, the Examiner's assertion is pure speculation because there is no corona discharge in Miller and because there is no suggestion of providing Miller with a corona discharge, for the reason set forth above with respect to Claim 1. In addition, Claim 7 requires that the ionizing at the corona discharge is done in the presence of air at a normal atmospheric pressure. Thus, Syms does not teach providing a corona discharge in Miller and does not further teach that the corona discharge causes ionization in the presence of air in normal atmospheric pressure. Thus, Syms fails to make up for the deficiencies of Miller. Accordingly, the rejection of Claim 7 should be withdrawn.

Turning to Claim 15, the Claim now recites that the gas flows before and around a feed tube opening for the vaporized sample. This is shown at least in the non-limiting example of Figs. 6a and 6b. Neither reference teaches or suggests this claim feature because in Miller, there is no feed tube that the gas goes around. Rather, the electrospray enters the area containing carrier gas 90. Nor is there a feed tube for the vaporized sample that the gas is injected toward. Accordingly, Claim 15 is allowable over the applied references.

Turning to claim 16, the claim recites that the gas flow is fed through one feed opening, in order to distribute the gas flow around the liquid flow comprising a sample, and as a result, a homogenous mixture is achieved. The Official Action takes the position that this is taught by Miller in Fig. 13A. However, there is nothing in Miller to suggest that a homogenous mixture is

achieved, but rather only that the electrospray is injected into the gas flow 90. Accordingly, claim 16 is not taught or suggested by the combined teachings of Miller and Syms.

Turning to Claim 17, Claim 17 is similar to Claim 1, but in apparatus format, and is patentable for the reasons set forth above, with respect to the corona discharge.

Turning to Claim 28, this claim is allowable for the same reasons set forth above with respect to Claim 15.

Turning to claim 29, the Official Action takes the position (page 9) that the combined teachings of Miller and Syms fails to teach that the resistors are made narrow near the mixing zone of the gas and liquid. To overcome this deficiency of Miller and Syms, the Official Action (page 9) takes the position that it simply would have been an obvious variant, without citing any evidence to support the position. The Examiner seems to describe the benefits achieved by the claim language. However, the benefits achieved are not a suggestion of obviousness of the limitation but rather a suggestion of nonobviousness. The mere statement that the claim limitation is an obvious variant does not establish a *prima facie* case of obviousness of the recited limitation. In the absence of any prior art teaching or suggesting this limitation, or some articulated reasoning with factual underpinnings, the rejection of Claim 29 is in error and should be withdrawn.

Turning to the rejection of claims 8, 9, 24 and 25 under 35 U.S.C. § 103(a) as being unpatentable over Miller in view of Syms and Guevremont, Applicant notes that with respect to Claims 8 and 24, the Official Action takes the position (pages 10 and 11) that the combined teachings of Miller and Syms do not teach that the needle is connected to a voltage which is so high in relation to the curtain voltage of the mass spectrometer that the electric field strength, at least in the immediate vicinity of the tip, exceeds the corona discharge threshold of air. To

overcome this deficiency of Miller and Syms, the Official Action turns to Guevremont for a teaching of this feature; relying on para. [0142].

Guevremont describes an ion mobility spectrometer and only conventional ESI, APCI and APPI sources having no particular relevance with regard to the present application. Although Guevremont does recite that there should be a strong electrical field around the tip of the needle to provide a fine spray of liquid droplets in the formation of ions and provides typical voltages that would be used, Applicant finds no suggestion in the reference that the voltage exceeds the corona discharge threshold of air. Accordingly, in the absence of some suggestion in the prior art or some articulated reasoning with a factual underpinning, the rejection of Claims 8 and 24 is in error and should be withdrawn.

Turning to the rejection of claims 22, 23 and 26 under 35 U.S.C. § 103(a) as being unpatentable over Miller in view of Syms and Apffel, Applicant notes that with regard to Claim 22, the claim recites that the heater is formed in a glass plate. To overcome this deficiency of Miller and Syms, the Official Action turns to Apffel for a teaching that the heater may be formed in glass, relying broadly on columns 6-7. Applicant respectfully traverses this rejection. Apffel describes introducing ions to a mass spectrometer such that the ions can be brought from two or more channels to a vacuum. This is actually a part of a mass spectrometer which is used for bringing the ions to vacuum and mass spectrometric analyses. This has nothing to do with ionization or ionizer, let alone the microchip used for ionization. A nebulizer is only shortly mentioned as being used for ionizing the compounds. However, it is a standard system which has no relevance with regard to the present application. Apffel, in particular columns 6-7, reveals that the only reference to glass (col. 7, line 1) is the statement that the capillary tube is made of glass. The fact that a capillary tube is made of glass is not a suggestion of a heater formed in a

glass plate. In addition, Applicant notes that the term heat or heater does not appear anywhere in the Apffel reference. Accordingly, for at least these reasons, the rejection of Claim 22 is in error and should be withdrawn.

Turning to claim 23, the Official Action takes the position (page 12) that the combined teachings of Miller and Syms fails to teach that the gas and liquid flow channels are formed from glass. To overcome this deficiency of Miller and Syms, the Official Action turns to Apffel for a teaching of glass and liquid flow channels formed from glass; once again broadly relying on cols. 6-7 of Apffel.

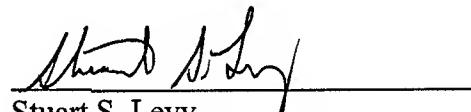
From Applicant's review of Apffel, in particular columns 6-7, Applicant finds that the only reference to glass in the reference is found in column 7, line 1 and this is in the context of a capillary tube being formed of glass. The fact that the capillary tube is formed of glass is not a teaching of having both the gas and liquid flow channels formed of glass. In addition, Claim 23 requires that a silicon wafer has a heater formed therein for vaporizing a solution sample. The Official Action does not refer to any teaching in Apffel of having a silicon wafer in which a heater for vaporizing a sample solution is formed. Nor does Applicant find any teaching or suggestion of this claimed feature. Accordingly, the rejection of Claim 23 should be withdrawn.

Turning to claims 26, the Official Action takes the position (pages 12 and 13) that the combined teachings of Miller, Syms and Apffel fail to teach that the entire device is fabricated from glass. However, the Official Action takes the position that in view of the teachings of Apffel, cols. 6-7, that this limitation would have been obvious. Applicant respectfully traverses this rejection because the fact that Apffel teaches that a capillary tube is formed of glass is not a suggestion of fabricating the entire device of the microstructure from glass. Accordingly, the rejection of Claim 26 is in error and should be withdrawn.

In addition, newly presented Claims 33-37 should be allowable because the limitations of these claims are not taught or suggested by the applied references. In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,



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